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**BANK-BASED FINANCIAL DEVELOPMENT AND FOREIGN DIRECT INVESTMENT IN SUB-SAHARAN AFRICAN COUNTRIES: A DYNAMIC CAUSAL LINKAGE**

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Nicholas M. Odhiambo
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Nicholas M. Odhiambo
Department of Economics
University of South Africa
P. O. Box 392, UNISA
0003, Pretoria
South Africa
Emails: odhianm@unisa.ac.za / nmbaya99@yahoo.com

# BANK-BASED FINANCIAL DEVELOPMENT AND FOREIGN DIRECT INVESTMENT IN SUB-SAHARAN AFRICAN COUNTRIES: A DYNAMIC CAUSAL LINKAGE


## Abstract

In this paper, the causal relationship between financial development and foreign direct investment in sub-Saharan African (SSA) countries is examined. Three proxies of financial development, namely bank deposits, deposit money bank assets, and liquid liabilities have been used to examine this linkage. Using a multivariate panel Granger-causality model, the study found that the causal relationship between financial development and foreign direct investment is dependent on the variable used to measure the level of financial development. The relationship also varies over time. Overall, the study found a causal flow from FDI to financial development to predominate, at least in the short run. The study, therefore, recommends that policies aimed at attracting foreign direct investment inflows should be prioritised in SSA countries in the short run, in order to foster the development of the financial sector in the region.


## 1. Introduction

The relationship between financial development and FDI has not been fully explored in the literature. The majority of the previous studies on FDI have mainly focused on the relationship between FDI and economic growth. However, previous studies have found that FDI contributes more to economic growth in a more developed financial system (see Alfaro et al., 2004, 2010; Hermes and Lensink, 2003). Others have argued that an increase in FDI net inflows increases the funds available in the economy and causes financial intermediation through financial markets or the banking system to boom (see Desai et al., 2006; Henry, 2000). In addition, some studies have shown that a well-developed stock market financial sector is likely to increase the liquidity of listed companies, which has the potential of reducing the cost of capital, thereby making the country more attractive to foreign investment (see Desai et al., 2006). In other studies, it has also been found that a well-functioning financial market is likely to channel

foreign investments more efficiently into productive sectors, thereby creating more value for investors and making the country more attractive to FDI (Otchere et al. 2016).

Despite this undeniable link between FDI and financial development, very little research has been conducted on the causal link between FDI and financial development. The majority of the previous studies on the role of FDI have mainly focussed on the relationship between FDI and economic growth (see, for example, Asongu and Odhiambo, 2020; Alvarado et al. 2017; Gammoudi et al. 2016; Mahembe and Odhiambo, 2016; Anwar and Nguyen, 2010; Adams, 2009; Zhang, 2001). Even where such studies have been conducted, the findings have been inconclusive (see, for example, Soumare´ and Tchana, 2015; Bayar and Gavriletea, 2018). In addition, the focus of most of the previous studies has largely been on Europe, Asia and Latin America, thereby leaving many sub-Saharan African (SSA) countries with little or no coverage (see, for example, Bayar and Gavriletea, 2018; Suliman and Elian, 2014; Sahina and Ege, 2015). Moreover, some of the previous studies based their inferences on a bivariate Granger-causality, which is known to suffer from omission-of-variable bias. As has been reported in previous studies, the inclusion of an additional variable in a bivariate causality setting has the potential not only to alter the magnitude of the estimates, but also change the direction of causality.

It is against this background that the current study aims to examine the causal relationship between FDI and financial development using time-series data from middle-income SSA. Considering the fact that stock markets in many SSA countries are still in their infancy, the study employs mainly bank-based financial indicators to measure the level of financial development. Specifically, the study uses three proxies of bank-based financial development, namely bank deposits to GDP (%) – FinDev1, deposit money bank assets to GDP (%) –

FinDev2, and liquid liabilities to GDP (%) – FinDev3. The main aim of using three proxies of financial development is to test whether the relationship between FDI and financial development is sensitive to the proxies used to measure the level of financial development. Moreover, since the financial system in many SSA countries are still bank-based, these three proxies give a true reflection of the nature of the financial sector development prevailing in the countries under study.

In order to address the omission-of-variable variable, which is inherent in a bivariate Granger-causality model, the study incorporates economic growth as an intermittent variable between FDI and financial development, thereby leading to a system of multivariate panel Granger-causality models. The study uses the Pedroni (1999) panel cointegration test to investigate the long-run relationship between the various proxies of bank-based financial development and FDI in a multivariate setting, and the panel Granger-causality test to examine the causal link between these variables.

The rest of the paper is structured as follows: Section 2 gives an overview of some of the previous studies that have been conducted on the relationship between financial development and FDI. Section 3 deals with the estimation techniques and empirical analysis, while section 4 concludes the study.

## 2. Literature Review

The relationship between financial development and foreign direct investments has attracted a burgeoning of studies in recent decades. The thrust of these studies has been to examine whether there is any link between financial development and foreign direct investment in the

process of economic development. Some of the studies that have attempted to examine this linkage include, amongst others, those by Hermes and Lensink (2003), Alfaro et al. (2004), Choong et al. (2004), Ljungwall and Li (2007), Campos and Kinoshita (2008), Kholdy and Sohrabian (2008), Ang (2009a,b), Lee and Chang (2009), Nasser and Gomez (2009), Choong and Lim (2009), Dutta and Roy (2011), Choong and Lam (2011), Choong (2012), Agbloyor et al. (2013), Sghaier and Abida (2013), Desbordes and Wei (2014), Suliman and Elian (2014), Soumare´ and Tchana (2015), Sahina and Ege (2015), Chen at al. (2015), Otchere et al. (2016), and Bayar and Gavriletea (2018).

Hermes and Lensink (2003), while examining the relationship between foreign direct investment, financial development and economic growth in 67 countries, found that FDI does not contribute to economic growth in countries with weak financial systems. Alfaro et al. (2004), while examining the various links among foreign direct investment (FDI), financial markets, and economic growth using cross-country data between 1975 and 1995, found that countries with well-developed financial markets gain significantly from FDI. Choong et al. (2004), while investigating the patterns of foreign direct investment (FDI) and economic growth among select developed and East Asian countries, found that the presence of FDI inflows creates a positive technological diffusion in the long run only if the evolution of the domestic financial system has achieved a certain minimum level.

Ljungwall and Li (2007), while examining the role played by financial sector development in enabling 28 Chinese provinces to enjoy FDI triggered economic growth benefits during the period from 1986 to 2003, found that financial sector development has a positive and significant influence on FDI's ability to contribute towards economic growth in Chinese provinces. Campos and Kinoshita (2008) examine the relationship between structural reforms

and FDI inflow into 19 Latin American and 25 Eastern European countries. Their findings show that financial sector reforms do not only attract FDI, but they also enable the host countries to benefit more from FDI spill-over effects. Kholdy and Sohrabian (2008), while investigating whether foreign direct investment (FDI) could stimulate financial development in countries with corrupt dominant élites, found evidence which suggests that FDI may jump-start financial development in developing countries by forcing the host country to liberalise its financial market, thereby allowing more competition in the financial sector. Ang (2009a), while examining the roles of foreign direct investment and financial development in the process of economic development using Thailand as a case study, found that an increase in the level of financial development enables Thailand to gain more from foreign direct investment, suggesting that the impact of foreign direct investment on output growth can be enhanced through financial development. Ang (2009b), while assessing the relationship between financial development and the FDI-growth nexus in Malaysia during the period 1965 to 2004, found that the impact of FDI on output could be enhanced through financial development. Choong and Lim (2009), while examining the relationship between foreign direct investment, financial development and economic growth in Malaysia, found that the interaction between FDI and financial development exerts a significant effect on economic growth in Malaysia.

Lee and Chang (2009), while examining the relationship between FDI, financial development and economic growth using data from 37 countries, found that Financial development indicators have a larger effect on economic growth than does FDI. Nasser and Gomez (2009), while assessing whether well-functioning financial markets promote FDI flows to Latin America, found that there is a positive relationship between FDI and financial development in the studied countries. Dutta and Roy (2011), while examining the relationship between foreign direct investment, financial development and political risks using data from 97 developed and

developing countries, found that there is a non-linear relationship between foreign direct investment and financial development.

Choong and Lam (2011), while examining relationship between financial development, FDI and economic growth in a group of 70 developed and developing countries, found that there is a certain level of financial sector development that is necessary for FDI to have a positive effect on economic growth. Choong (2012), while examining the relationship between FDI, economic growth and financial development in 95 developing and developed countries using the dynamic GMM panel data approach during the period 1983-2006, found that higher level of financial development was a precondition for FDI related benefits in the host countries. While investigating the causality between FDI and financial development in Africa using panel regression model, Agbloyor et al. (2013) found that FDI and financial development positively affected each other in African countries. Sghaier and Abida (2013), while analysing the relationship between FDI, economic growth and financial development in four North African countries (Tunisia, Morocco, Algeria and Egypt) during the period 1980-2011, found that financial development quickened the rate at which FDI facilitated economic growth in all the four North African countries. Desbordes and Wei (2014), while assessing the effects of financial development on foreign direct investment in 67 developed and developing countries, found that FDI promotes financial development only in financially vulnerable sectors.

Suliman and Elian (2014), while assessing the causality between FDI, financial development and economic growth in Jordan using a structured co-integration and vector error correction (VEC) models during the period 1980-2009, found that a well-developed stock markets could enable Jordan to enjoy more FDI spilled over technological diffusion benefits. Soumare´ and Tchana (2015), while examining the causal relationship between FDI and financial market

development in 29 emerging market economies, found that there is a bidirectional causality between FDI and stock market development indicators. However, the study found that the relationship between FDI and bank-based financial development was ambiguous. Sahina and Ege (2015), while examining the relationship between financial development and FDI in Greece and neighbouring countries, found that FDI has a predictive power to forecast financial development in all of the countries except for Macedonia. In addition, the study found that there is bidirectional causality between financial development and FDI in Turkey. Chen at al. (2015), while examining the link between regional financial development and foreign direct investment using a large micro-level dataset of Chinese manufacturing enterprises, found that domestic firms located in financially developed regions gain positive knowledge spill-overs from foreign direct investment. Otchere et al. (2016), while examining the direct causal relationship between financial market development and foreign direct investment in Africa using data from 1996 to 2009, found that there is a bidirectional positive relationship between FDI and financial market development in African countries. More recently, Bayar and Gavriletea (2018), while analysing the interactions between FDI inflows and financial sector development in Central and Eastern European Union countries during the period between 1996 and 2015, found that there is a one-way causality from financial sector development to FDI inflows over the short run. Table 1 gives a summary of the findings of these studies, including the countries covered, the methodology used as well as their findings.

**Table 1: A summary of studies on the relationship between FDI and Financial Development**

| Author(s) (Year) | Region/Country | Methodology | Conclusion |
|---|---|---|---|
| Hermes and Lensink (2003) | 67 countries | Panel data analysis | • Financial development is an important precondition for FDI to have a positive impact on economic growth. |
| Alfaro et al. (2004) | 20 OECD countries and | Cross-sectional data analysis | • A well-functioning financial increases the effect of FDI in |

| Author(s) (Year) | Region/Country | Methodology | Conclusion |
|---|---|---|---|
| | 51 non-OECD countries | | promoting the economic growth. |
| Choong et al. (2004) | Select developed and East Asian countries | Multivariate cointegration and error-correction model | • The presence of FDI inflows creates a positive technological diffusion in the long run only if the evolution of the domestic financial system has achieved a certain minimum level. |
| Ljungwall and Li (2007) | 28 Chinese provinces | | • Financial sector development has a positive and significant influence on FDI's ability to contribute towards economic growth in Chinese provinces. |
| Campos and Kinoshita (2008) | 19 Latin American and 25 Eastern European countries. | Panel data analysis | • Financial sector reforms do not only attract FDI, but they also enable the host countries to benefit more from FDI spill-over effects. |
| Kholdy and Sohrabian (2008) | 22 developing countries | Multivariate Error Correction Model (ECM) model. | • FDI may jump-start financial development in developing countries. |
| Ang (2009a) | Thailand | Unrestricted ECM | • The impact of foreign direct investment on output growth can be enhanced through financial development. |
| Ang (2009b) | Malaysia | Cointegration and causality techniques | • The impact of FDI on output could be enhanced through financial development. |
| Choong and Lim (2009) | Malaysia | Co-integration and error correction model | • The interaction between FDI and financial development exerts a significant effect on economic growth in Malaysia. |
| Lee and Chang (2009) | 37 countries | Panel data analysis | • Financial development indicators have a larger effect on economic growth than does FDI. |
| Nasser and Gomez (2009) | 15 Latin American countries | Panel Data Analysis | • There is a positive relationship between FDI and financial development. |
| Dutta and Roy (2011) | 97 developed and developing countries | Panel Data Analysis | • There is a non-linear relationship between FDI |

| Author(s) (Year) | Region/Country | Methodology | Conclusion |
|---|---|---|---|
| | | | and FD. FDI stimulates financial development up to a specific level of FDI flows. |
| Choong and Lam (2011) | 70 developed and developing countries | Panel data analysis | • Financial development is a significant prerequisite for FDI to have a positive effect on economic growth. |
| Choong (2012) | 95 developing and developed countries | \|Dynamic GMM panel data approach | • Higher level of financial development is a precondition for FDI related benefits in the host countries. |
| Agbloyor et al. (2013) | Africa | Panel regression model | • FDI and financial development positively affected each other in African countries. |
| Sghaier and Abida (2013) | 4 countries (Tunisia, Morocco, Algeria and Egypt) | Panel Data Analysis | • The development of the domestic financial system is an important prerequisite for FDI to have a positive effect on economic growth. |
| Desbordes and Wei (2014) | 67 developed and developing countries | Panel Data Analysis | • FDI promotes financial development only in financially vulnerable sectors. |
| Suliman and Elian (2014) | Jordan | Structured co-integration and vector error correction (VEC) model | • A well-developed stock market could enable Jordan to enjoy more FDI spilled over technological diffusion benefits. |
| Soumare´ and Tchana (2015) | 29 emerging market economies | Panel data analysis | • A bidirectional causality between FDI and stock market development indicators is found to prevail. However, the relationship between FDI and bank-based financial development is found to be ambiguous. |
| Sahina and Ege (2015) | Greece and neighbouring countries (Bulgaria, Macedonia and Turkey) | A Panel Data Analysis 1996-2012 | • FDI has a predictive power to forecast financial development in all of the countries except for Macedonia. In addition, findings indicate that there is bidirectional causality in Turkey. |

| Author(s) (Year) | Region/Country | Methodology | Conclusion |
|---|---|---|---|
| Chen at al. (2015) | Micro-level dataset of firms from the Chinese manufacturing sector | Cross-sectional analysis | • Domestic firms located in financially developed regions gain positive knowledge spillovers from foreign direct investment. |
| Otchere et al. (2016) | African countries | GMM estimation technique | • There is a bidirectional positive relationship between FDI and financial market development. |
| Bayar and Gavriletea (2018) | Central and Eastern European Union Countries | A Panel Cointegration and Causality | • There is a one-way causality from the development of financial sectors to FDI inflows over the short run. |

## 3. Estimation Techniques and Empirical Analysis

### 3.1 Empirical Model Specification

The Granger-causality models used in this study can be expressed as follows:

**Model 1:** ***FinDev1* (*Bank Deposits), FDI, and y***

$$\Delta \mathrm{FinDev1}_{\mathrm{it}} = \alpha_{0\mathrm{i}} + \sum_{m=1}^{P} \alpha_{1\mathrm{im}} \Delta \mathrm{FinDev1}_{\mathrm{it-m}} + \sum_{m=1}^{P} \alpha_{2\mathrm{im}} \Delta \mathrm{FD1}_{\mathrm{it-m}} + \sum_{m=1}^{P} \alpha_{3\mathrm{im}} \Delta \mathrm{y}_{\mathrm{it-m}} + \alpha_4 ECT_{t-1} + \varepsilon_{it} \ldots\ldots\ldots\

**Model 2: FinDev2 (Money Bank Assets), FDI, and y**

$$\Delta \mathrm{FinDev2_{it}} = \alpha_{0\mathrm{i}} + \sum_{m=1}^{P} \alpha_{1\mathrm{im}} \Delta \mathrm{FinDev2_{it-m}} + \sum_{m=1}^{P} \alpha_{2\mathrm{im}} \Delta \mathrm{FDI_{it-m}} + \sum_{m=1}^{P} \alpha_{3\mathrm{im}} \Delta \mathrm{y_{it-m}} + \alpha_4 ECT_{t-1} + \varepsilon_{it} \ldots\ldots\ldots\

$$\Delta \mathrm{FDI}_{\mathrm{it}} = \beta_{0\mathrm{i}} + \sum_{m=1}^{P} \beta_{1\mathrm{im}} \Delta \mathrm{FDI}_{\mathrm{it-m}} + \sum_{m=1}^{P} \beta_{2im} \Delta FinDev3_{it-m} + \sum_{m=1}^{P} \beta_{3im} \Delta y_{it-m}$$

$$+ \beta_4 ECT_{t-1} + \varepsilon_{it} \ldots\ldots\ldots\

| | | | |
|---|---|---|---|
| | (proxied by liquid liabilities (LLB) | | |
| y | Economic growth – proxied by GDP per capita | GDP per capita (y) | WDI |

WDI: World Development Indicators. GDP: Gross Domestic Product; FDSD: Financial Development and Structure Database

## 4. Empirical Analysis

### 4.1 Panel Unit Root Test

Three panel unit root tests are employed in order to identify the order of integration of the variables used in this study. These include: i) Levin-Lin-Chu (LLC) (2002); ii) Im, Pasaran and Shin (IPS) (2003); and iii) the Augmented Dickey-Fuller (ADF) unit root tests. The results of unit root tests are presented in Table 3.

**Table 3: The results of panel unit root tests**

| | **LLC *t*-Statistics** | | **IPS W-Statistics** | | **ADF - Fisher Chi-square** | |
|---|---|---|---|---|---|---|
| | **Level** | **First Difference** | **Level** | **First Difference** | **Level** | **First Difference** |
| FinDev1 (BD) | -1.26732 | -8.68788*** | 0.80326 | -6.59427*** | 25.5269 | 169.790*** |
| FinDev2 (BDMBA) | 0.82974 | -9.44064*** | 0.21409 | -8.91205*** | 31.8444 | 155.581*** |
| FinDev3 (LLB) | 2.07663 | -12.7073*** | 0.84310 | -6.19937*** | 25.7726 | 183.593*** |
| FDI | 0.26381 | -13.0146*** | -0.91125 | -6.09994*** | 31.2333 | 102.558*** |
| y | 0.62335 | -5.46254*** | 2.90210 | -7.13126*** | 23.2926 | 149.604*** |

Note: *** indicates rejection of the respective null hypothesis at the 1% level of significance.

The results of panel unit root tests reported in Table 3 show that all the variables used in this study are integrated of order 1. Hence, we can now proceed to conduct panel cointegration test.

### 4.2 Panel Cointegration Test

In order to examine whether there is a long-run relationship among the variables used in this study, three panel cointegration tests are employed, namely: (i) the Pedroni (2004) residual

cointegration test; (ii) the Kao (1999) residual cointegration test; and iii) Johansen Fisher panel cointegration test. The results of cointegration tests are reported in Tables 4 and 5.

## Table 4: Panel cointegration results

| | **Pedroni Cointegration Test** | | | | | |
|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 2** | | **Model 3** | |
| | **Statistic** | **Probability** | **Statistic** | **Probability** | **Statistic** | **Probability** |
| Pedroni panel cointegration test – within-dimension | | | | | | |
| Panel v-Statistic | 2.779958 | 0.0027 | 1.358817 | 0.0871 | 2.936575 | 0.0017 |
| Panel rho-Statistic | -4.550034 | 0.0000 | -4.797997 | 0.0000 | -4.567000 | 0.0000 |
| Panel PP-Statistic | -4.140050 | 0.0000 | -5.807884 | 0.0000 | -4.058077 | 0.0000 |
| Panel ADF-Statistic | -2.416226 | 0.0078 | -3.913802 | 0.0000 | -5.624473 | 0.0000 |
| Pedroni panel cointegration test – between-dimension | | | | | | |
| Group rho-Statistic | -2.451219 | 0.0071 | -1.715554 | 0.0431 | -2.789296 | 0.0026 |
| Group PP-Statistic | -3.796243 | 0.0001 | -4.224960 | 0.0000 | -4.340637 | 0.0000 |
| Group ADF-Statistic | -1.846563 | 0.0324 | -3.874706 | 0.0001 | -10.59395 | 0.0000 |
| **Kao Residual Cointegration Test** | | | | | | |
| | **t-Statistic** | **Probability** | **t-Statistic** | **Probability** | **t-Statistic** | **Probability** |
| ADF | -3.317914 | 0.0005 | -3.068493 | 0.0011 | -3.294315 | 0.0005 |

**Table 5: Johansen Fisher Panel Cointegration test**

| **Johansen Fisher Panel Cointegration Test Result** | | | | |
|---|---|---|---|---|
| **Model 1(FDI, FinDev1, y)** | | | | |
| No. of CE(s) | trace test | Probability | Max-eigen test | Probability |
| None | 58.95 | 0.0000 | 54.97 | 0.0000 |
| At most 1 | 22.53 | 0.1269 | 17.86 | 0.3321 |
| At most 2 | 18.03 | 0.3220 | 18.03 | 0.3220 |
| **Model 2(FDI, FinDev2, y)** | | | | |
| No. of CE(s) | trace test | Probability | Max-eigen test | Probability |
| None | 67.12 | 0.0000 | 57.10 | 0.0000 |
| At most 1 | 27.90 | 0.0325 | 29.86 | 0.0188 |
| At most 2 | 10.26 | 0.8526 | 10.26 | 0.8526 |
| **Model 3(FDI, FinDev3, y)** | | | | |
| No. of CE(s) | trace test | Probability | Max-eigen test | Probability |
| None | 73.03 | 0.0000 | 62.19 | 0.0000 |
| At most 1 | 41.22 | 0.0002 | 37.93 | 0.0005 |
| At most 2 | 18.08 | 0.2032 | 18.08 | 0.2032 |

The results of cointegration tests reported in Tables 4 and 5 show that all the variables in Models 1-3 are cointegrated. All the three cointegration tests reject the null hypothesis of no cointegration among the variables used in this study.

### 4.3 Panel Granger –Causality Test

Having found that the variables used in this study are cointegrated, the next step is to test the causality between the various proxies of FD and FDI using a panel Granger-causality model. For this purpose, economic growth is used as an intermittent variable between the various proxies of financial development and foreign direct investment. The results of the short-run and long-run causality are reported in Table 6.

**Table 6: Granger-causality results for all models**

| | **Independent Variable** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dependent Variable** | **Model 1 FinDev1 (Bank Deposits), FDI, and y** | | | | **Model 2 FinDev2 (Money Bank Assets), FDI, and y** | | | | **Model 3 FinDev3 (Liquid liabilities), FDI, and y** | | | |
| | **Short-run causality** | | | **Long-run causality** | **Short-run causality** | | | **Long-run causality** | **Short-run causality** | | | **Long-run causality** |
| | **Δy** | **ΔFinDev1** | **ΔFDI** | **ECT (t-statistics)** | **Δy** | **ΔFinDev2** | **ΔFDI** | **ECT (t-statistics)** | **Δy** | **ΔFinDev3** | **ΔFDI** | **ECT (t-statistics)** |
| **Δy** | — | 1.0148 [0.365] | 3.737** [0.026] | -0.011*** (-3.446) | — | 0.835 [0.436] | 2.778* [0.065] | -0.009*** (-3.040) | — | 1.683 [0.189] | 2.392* [0.094] | -0.009*** (-3.250) |
| **ΔFinDev1/2/3)** | 1.833 [0.163] | – | 1.028 [0.360] | -0.013 (-1.367) | 2.752* [0.067] | – | 7.901*** [0.000] | -0.011 (-0.673) | 0.592 [0.621] | – | 6.968*** [0.000] | -0.057* (-1.740) |
| **ΔFDI** | 6.024*** [0.000] | 1.420 0.209 | – | -0.862*** (-5.305) | 6.294*** [0.000] | 4.129*** [0.003] | – | -0.848*** (-7.371) | 3.316** [0.039] | 2.262 [0.110] | – | -0.550*** (-6.728) |

Note: i) F-statistics show the short-run causality, while ECT (t-statistics) show the long-run causality.
ii) *; **; *** denote significance at 10%, 5% and 1% respectively.

The results reported in Table 6 show that the causal relationship between financial development and foreign direct investment is sensitive to the proxy used to measure the level of financial development. When bank deposits, i.e. FinDEv1 is used as proxy for financial development (Model 1), no causality is found to prevail between financial development and foreign direct investment in either direction. This is confirmed by i) the insignificant corresponding F-statistic and the coefficient of the ECM in the financial development equation; and ii) the corresponding F-statistic in the foreign direct investment equation.

When deposit money bank assets, i.e. FinDev2 variable is used as a proxy for financial development (Model 2), a bidirectional causality is found to prevail between financial development and foreign direct investment in the short run, while a unidirectional causality from financial development to FDI is found to predominate in the long run. The short-run bidirectional causality is confirmed by the corresponding F-statistics in both FinDev2 and FDI equations, which have been found to be statistically significant. Likewise, the long-run unidirectional causality from financial development to FDI is confirmed by the error-correction term in the FDI equation, which has been found to be negative and statistically significant, as expected.

Finally, when liquid liabilities, i.e. FinDev3 variable is used a proxy for financial development, a unidirectional causality is found to prevail from FDI to financial development. This applies irrespective of whether the causality is estimated in the short run or in the long run. While the short-run unidirectional causality from FDI to financial development (FinDev3) is confirmed by the corresponding F-statistic in the financial development equation, the long-run causality is confirmed by the coefficient of the error-correction term in the financial development equation, which has been found to be negative and statistically significant.

In summary, the results show that i) there is a neutral causal relationship between FDI and financial development when bank deposits are used as a proxy; ii) a unidirectional causal flow from financial development to FDI is found to predominate when deposit money bank assets are used as a proxy, but only in the long run; and iii) there is a distinct unidirectional causality from FDI to financial development when liquid liabilities are used as a proxy both in the short and in the long run. Although the causal relationship between financial development and FDI tends to change as the financial development proxy changes, on balance, the results show that the causality from FDI to financial development tends to predominate, at least in the short run.

Other results show that for Model 1, (i) there is a short-run bidirectional causality between FDI and economic growth and long-run unidirectional causality from economic growth to FDI; and (ii) no causality exists between financial development and economic growth. For Model 2, there is: (i) a short-run and long-run bi-directional causality between FDI and economic growth; and ii) a short-run unidirectional causality from economic growth to financial development. For Model 3, (i) there is a bidirectional causality between FDI and economic growth; and ii) no causality exists between financial development and economic growth in either direction.

## 5. Conclusion

In this study, we examine the causal relationship between financial development and foreign direct investment in sub-Saharan African countries during the period between 1980 and 2018. The study attempts to answer two critical questions: i) Does financial development Granger-cause foreign direct investment; and ii) Does the causal relationship between financial development depend on the proxy used to measure the level of financial development. Although a number of studies have been conducted on the relationship between financial development and foreign direct investment, the majority of the previous studies have mainly concentrated on the complementarity between the two variables in the process of economic

development. Very few studies have focused on the dynamic causal relationship between these two important macroeconomic variables. In addition, the majority of the previous studies mainly concentrated on Asia and Latin American countries. Studies on sub-Saharan African countries where foreign direct investment is needed most are difficult to come by. Previous results on this subject have also been inconclusive at best, and some of them have been mired by a number of methodological weaknesses. In order to address the weaknesses of the previous studies, the current study uses three proxies of financial development, namely: i) bank deposits /GDP (FinDev1), deposit money bank assets/GDP (FinDev2), and liquid liabilities/ GDP. The study also uses GDP per capita (economic growth) as an intermittent variable between financial development and foreign direct investment in a multivariate setting in order to address the omission-of-variable bias associated with some previous studies. In addition, the study uses three unit root tests, namely: LLC, IPS and ADF - Fisher Chi-square; and three cointegration tests, namely the Pedroni cointegration test, the Kao residual cointegration test and the Johansen Fisher panel cointegration test to examine this linkage. Using panel ECM-based Granger causality model, the study found that the causal relationship between financial development and FDI varies significantly – depending on the variable used as a proxy for financial development. It is also sensitive to time lag. When bank deposits, i.e. FinDEv1 is used as proxy for financial development (Model 1), no causality is found to prevail between financial development and foreign direct investment in either direction. When deposit money bank assets, i.e. FinDev2 variable is used as a proxy for financial development (Model 2), a bidirectional causality is found to prevail between financial development and foreign direct investment in the short run, while a unidirectional causality from financial development to FDI is found to predominate in the long run. Finally, when liquid liabilities, i.e. FinDev3 variable is used a proxy for financial development, a unidirectional causality is found to prevail from FDI to financial development. This applies irrespective of whether the causality is estimated in

the short run or in the long run. Overall, the study found a causal flow from FDI to financial development to predominate in the short run. This finding has important policy implications as it underscores the key role that FDI can play in the development of the financial sector in sub-Saharan African countries. The study, therefore, recommends that policies aimed at attracting FDI inflows should be prioritised in SSA countries in the short run in order to foster the development of the financial sector in the region

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